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| Commission Action: | |

STAFF REPORT: REGULAR CALENDAR

APPLICATION NO.: 1-92-69

**APPLICANT: CALIFORNIA DEPT. OF TRANSPORTATION
DISTRICT 1**

PROJECT LOCATION: At the Mouth of the Mad River, just south of Clam Beach, adjacent to Highway 101, McKinleyville area of Humboldt County; APNs 511-351-01,05,07

PROJECT DESCRIPTION: Construction of a rock slope protection revetment (Phase I), and placement of an additional 1,000 feet of rock slope protection (approximately 12,000 cubic yards of two-ton rocks) (Phase II) to protect Highway 101 and the coastal vista point from wave damage. The work was completed in March 1992 for Phase I and July 1995 for Phase II under the authorization of Emergency Coastal Development Permit Nos. E-1-92-03G, E-1-92-08G, and E-1-95-05G.

LOCAL REVIEW: Humboldt County CDP Application #02-95 denied November, 1998

OTHER APPROVALS REQUIRED: U.S. Army Corps of Engineers.

SUBSTANTIVE FILE DOCUMENTS: Coastal Commission Appeal No. A-1-HUM-98-088; Coastal Commission Emergency Coastal Development Permit Nos. E-1-92-03G, E-1-92-08G, and E-1-95-05G; Humboldt County CDP Application #02-95; and the Humboldt County LCP

SUMMARY OF STAFF RECOMMENDATION

The permit application seeks authorization to retain as a permanent development a revetment constructed along the bank of the mouth of the Mad River in 1992 and 1995. The major issue raised by the application is whether or not the revetment as constructed has caused an acceleration of erosion and bluff retreat upstream of the revetment. Property owners of bluff top parcels have produced geologic reports indicating that the revetment is directly responsible for the increased erosion they have been experiencing along their bluffs. Caltrans denies that the revetment has accelerated the rate of bluff erosion, pointing out that the estuary is a very dynamic system subject to a complicated array of natural forces that can affect the rate of erosion. Caltrans attributes the accelerated rate of erosion to the unusual river, current, and ocean conditions caused by El Nino. In response to the concerns raised over bluff erosion, Caltrans contracted with Professor Borgeld of Humboldt State University to study the effects of the revetment. Although Caltrans has provided Caltrans staff - prepared summations of the findings of the report, Caltrans has not released the actual reports themselves. The summations do not adequately respond to the specific points raised by the bluff top property owners' geologists. In the absence of adequate geologic information that adequately addresses these points, Staff believes the Commission cannot make the required findings under Section 30253 of the Coastal Act that the project will not contribute significantly to the erosion and destruction of the bluffs along the river and will not necessitate the future construction of shoreline protective devices that would substantially alter the natural landform along the bluff. In addition, the application does not include an analysis of the impacts of the revetment on local sand supply, precluding the Commission from making required findings under Section 30235 that the project will not adversely affect local sand supply. Finally, the alternatives analysis submitted by the applicants does not address the full range of alternatives that may be available to protect Highway 101 and the vista point with the least amount of environmental damage. Therefore, staff recommends DENIAL of the application because based on the information currently available to the Commission, the project is inconsistent with Coastal Act provisions regarding these issues.

STAFF NOTES:**1. Jurisdiction and Standard of Review.**

The project site is bisected by the boundary between the permit jurisdiction of the Commission and Humboldt County. This application seeks Coastal Commission authorization for the portions of the proposed project that are within the Commission's retained jurisdiction. The areas of the project site that are within the Coastal Commission's retained jurisdiction include submerged areas, tidelands, or areas subject to the public trust. The portions of the subject development within the Commission's retained jurisdiction include the lower and western-most portions of the

rock slope protection which are tidelands and approximately half of the staging area that was constructed with earthen fill behind the revetment. The standard of review that the Commission must apply to the development addressed in Coastal Development Permit Application No. 1-92-69 is the Coastal Act.

2. Related Agenda Item.

At the September 16, 1999 meeting, the Commission will also conduct a de novo hearing on related Coastal Commission Appeal No. A-1-HUM-98-088. That application seeks authorization for the portions of the proposed project that are within the coastal development permit jurisdiction of Humboldt County. The Commission may decide to hold a joint hearing on the two applications.

3.. Development Authorized Pursuant to Emergency Permits

The development currently before the Commission was constructed pursuant to Emergency Permit Nos. E-1-92-03G, E-1-92-08G, and E-1-95-05G. The first two emergency permits, issued on February 4, 1992 and March 18, 1992, respectively, authorized the construction of a rock slope protection revetment along approximately 2,300 lineal feet of shoreline (Phase 1 of the overall development). Emergency Permit No. 1-95-05G, issued on March 22, 1995, authorized the construction of an additional 1,000 lineal feet of rock slope protection revetment to the south of the previously placed revetment (Phase 2 of the overall development. Condition 4 of each emergency permit specifies that emergency work is temporary and that a regular coastal development permit must be obtained in order to permanently authorize the work. Coastal Development Permit Application No. 1-92-69 was submitted as the follow-up application to seek permanent authorization for entire development authorized on a temporary basis by the three emergency permits.

I. MOTION, STAFF RECOMMENDATION AND RESOLUTION

The staff recommends that the Commission adopt the following resolution:

Motion.

I move that the Commission approve Coastal Development Permit No. 1-92-69 subject to conditions.

Staff Recommendation of Denial.

Staff recommends a **NO** vote and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution to Deny Permit:

The Commission hereby denies a coastal development permit for the proposed project on the grounds that the project, located between the sea and the first public road nearest the shoreline, is not in conformance with the provisions of Chapter 3 of the California Coastal Act of 1976. Granting of the permit would not comply with the California Environmental Quality Act because there are feasible mitigation measures or alternatives that would substantially lessen the significant adverse impacts of the development on the environment.

II. FINDINGS AND DECLARATIONS.

The Commission hereby finds and declares as follows:

A. Project and Site Description.

The proposed development consists of the construction of a 2,300-foot-long rock slope protection revetment (Phase I), and placement of an additional 1,000 feet of rock slope protection (approximately 12,000 cubic yards of two-ton rocks) (Phase II) to protect Highway 101 and an adjacent coastal vista point from wave damage (See Exhibits 3 and 4).

The work was completed in March 1992 for Phase I and July 1995 for Phase II under the authorization of Emergency Coastal Development Permit Nos. E-1-92-03G, E-1-92-08G, and E-1-95-05G. The current application seeks permanent approval of the development authorized under the three emergency permits.

The subject site is located at the mouth of the Mad River, just south of Clam Beach, adjacent to Highway 101, in the McKinleyville area of Humboldt County. The highway and vista point are on a bluff top that fronts along Clam beach.

For many years prior to the winter of 1992, the mouth of the Mad River existed further south. However, the river mouth had been known to oscillate along the coast for most of this century. For several decades prior to 1992 when the revetment was installed, the mouth migrated northward, cutting through the beach in a northerly direction near the base of the bluff. The causes for the northward migration are not well understood and are likely the result of several interacting factors. According to an alternatives analysis prepared by Caltrans for the Army Corps of Engineers dated January 15, 1999,

“the stretch of coastline where the river mouth migration is occurring is complex: large ocean tidal range; high ground water table; a complex interaction of ocean waves and fluvial dynamics; a narrow sand spit separating the river and the ocean; river bluffs composed primarily of sand; and the river current can carry large fallen trees which can strike the river bluffs. Upstream, the overall Mad River watershed has been substantially altered since the late 19th century. The Mad

River has been channelized in some locations and is currently dammed at Ruth Lake. Another Mad River dam, the Sweazy Dam was removed releasing a substantial load of accumulated sediment. Extensive logging and gravel mining operations in the Mad River watershed may also be contributing factors to the Mad River mouth migration. Finally, plate tectonics and resulting seismic activity may also influence the river mouth movement.”

As the river moved northward, a sand spit formed between the river and the ocean. In some years the river migrated northward several hundred feet a year (see Exhibit 5). Eventually, the northward migration of the mouth of the river reached a point where it threatened the bluff that supports the highway and vista point. According to the Alternatives Analysis, Caltrans had known about the impending threat to the river since 1988. Caltrans approached Humboldt County and the Army Corps of Engineers, to determine whether either agency was willing to take a direct roll in stopping the northward migration, such as by breaching the sand spit at a more southerly location to establish a new mouth for the river. Neither the County, the Corps, or Caltrans pursued such an option. Instead, Caltrans pursued a strategy of armoring the bank of the river in the vicinity of the Vista Point to protect both the vista point and the Highway itself.

As Highway 101 is the major north south artery for the region, Caltrans applied for and received emergency permits from the County, the Executive Director of the Coastal Commission, and the U.S. Army Corps of Engineers to construct a 2,300-foot-long revetment to halt the erosion. The revetment as constructed, curves along the northerly edge of the then mouth of the river. The engineered revetment is constructed of quarry rock. To facilitate construction of the revetment, Caltrans also stripped of vegetation and leveled approximately 6.85 acres of dunes immediately north and east of the revetment to establish a construction staging area and platform from which to mechanically lift the quarry rock into position along the revetment. This Phase I of the project was completed in 1992.

By 1995, erosion of the bluff immediately adjacent to the south of the constructed revetment threatened the bluff below the vista point. Caltrans sought and obtained additional emergency permits from the agencies to extend the rock revetment another 1,000 feet to the south to protect this additional portion of the bluff. This portion of the overall project is considered to be Phase II.

At some point after construction of the revetment, the sand spit at the south side of the mouth began to erode back to the south. As a result, the mouth of the river grew to approximately 3,000 feet in width. In early 1999, the river breached naturally at a new location approximately two miles south of the Caltrans revetment. Since then, a considerable amount of sand has been deposited at the location of the former mouth where the revetment was installed. The revetment itself is currently largely buried in sand.

According to the applicant, the project resulted in the loss of approximately 0.76 acres of dune hollow wetlands. These wetlands were located within the 6.85-acre area that was graded for construction of the staging area. To offset the loss of this 0.76 acres of dune hollow wetlands, Caltrans has submitted a mitigation plan. The plan calls for the restoration of the impacted 0.76 acres of dune hollow wetland on-site at a 1:1 ratio by restoring the existing degraded wetlands. An additional 0.84 acres of dune hollow wetlands may be created on-site for a total of 1.6 acres of wetlands. The areas to be restored to wetlands would be graded to create hollows and ridges that correspond to the natural landscape. After grading, invasive non-native plants within the mitigation area would be removed by hand. Native plants will then be planted in the mitigation area. The site would be fenced to protect it from illegal OHV activity.

The project site is bisected by the boundary between the Commission's retained permit jurisdiction and the coastal development permit jurisdiction of the County. The portion of the development within the Commission's jurisdiction is the subject of Coastal Development Permit Application No. 1-92-69.

B. Geologic Hazards.

Coastal Act Section 30253 states in applicable part:

“New development shall:

- (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
- (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.”*

Property owners of bluff top parcels upstream of the revetment contend that the revetment Caltrans constructed has contributed significantly to the erosion of their properties. This contention raises serious concerns about the project's consistency with Section 30235.

As noted previously, several years after the rock slope protection device was first installed, the rate of erosion of bluffs along the east side of the Mad River upstream of the revetment dramatically increased. The affected private parcels extend from a point approximately 200 feet from the southern end of the constructed revetment to the mouth of Widow White Creek, approximately ½ mile upstream. On one parcel, the bluff edge has retreated more than 20 feet during this period, and other bluff top parcels in the area have been experiencing an increased bluff retreat. The property owners assert that the increased rate of erosion is directly related to the construction of the revetment. The

property owners assert the erosion was accelerated by the southward movement of the mouth of the river after the revetment was installed. The property owners also assert that the revetment halted the previously rapid northward migration of the river mouth and in so doing, caused the mouth to broaden and move south. Between late 1996 until early 1999, the river mouth was located directly opposite the bluffs on the neighbors' projects, exposing these bluffs to direct wave attack from the ocean. In addition, the property owners contend that the changes resulting from construction of the revetment caused river currents to form an eddy opposite their bluffs which increased scouring of the bluffs.

During the course of the County's review of the application made by Caltrans to authorize permanently the portion of the project within the County's coastal Development Permit jurisdiction, the property owners hired two local geologists to evaluate the cause of accelerated erosion to their bluffs. The two geologists are Roland S. Johnson, Jr, Principal Engineering Geologist with SHN Consulting Engineers & Geologists, and Dr. Robert E. Busch Jr., Principal Engineering Geologist and Owner of Busch Geotechnical Consultants.

In a letter dated December 7, 1995 to Mr. Harry Conner, one of the affected property owners (attached as Exhibit 8), Mr. Johnson concludes that the level of bluff erosion upstream of the revetment became worse subsequent to the placement of Phase 1 of the revetment. Excerpts of the letter follow below:

"...I have recently conducted field investigations and reviewed various documents and photographs relative to erosion and slope failure of the bluff along the east bank of the Mad River...The investigations I conducted were relatively limited and the conclusions should be considered qualitative rather than quantitative...

"It is my opinion that the primary cause of the accelerated erosion is due to ocean waves that enter the river mouth, advance upstream, and expend their energy by loosening the unconsolidated soil at the river bank. The loosened soil is then washed into the river to be carried away by the river current...Erosion and bluff slope failure affecting you and your neighbors to the south is far more severe than along other segments of the Mad River Estuary. Without some form of stream bank stabilization major portions of your properties are likely to continue to erode and slide into the river...

"Now that the river mouth has been stabilized by installation of rock slope protection (RSP) and it is no longer able to continue migrating northward, river bank areas exposed to wave erosion are likely to be regularly impacted far into the foreseeable future. An additional problem resulting from the placement of (RSP) in the river mouth area is that a significant amount of the wave energy that was previously expended on the sandy banks and beaches adjacent to the mouth is

now reflected seaward, toward the landward side of the sand spit, and up the river to areas not protected by RSP...”

“If no stabilization measures are installed, you and your neighbors can expect to experience chronic large scale failures of the bluff slope. Eventually, the bluff top is likely to retreat significant distances eastward with the most rapid retreat occurring at the northern properties.”

“When the Mad River migrated northward past you and your neighbors property, a substantial amount of bluff base erosion and subsequent bluff slope failure was destined to occur. But the RSP installation...only increased the magnitude (or the rate) of river bank erosion in adjacent unprotected upstream areas. It is my opinion that the level of bluff erosion in the unprotected upstream region became worse subsequent to the placement of the original RSP) structure in the selected configuration....”

Dr. Busch has prepared two written statements addressing the bluff retreat occurring upstream of the revetment along the east side of the river. He prepared a statement dated September 14, 1998 prior to a Humboldt County Planning Commission hearing on the local coastal development permit application for the portion of the project within the County’s jurisdiction. He also prepared a statement dated July 9, 1999, prior to the Coastal Commission’s hearing on the Substantial Issue portion of the appeal of the County’s denial of the coastal development permit. Both statements are attached as Exhibit 9.

In the September 14, 1998 written statement, Dr. Busch concludes that a chief consequence of the installation of the revetment was the rapid-rate erosion of the coastal bluff east of and southeast of the mouth of the river. Excerpts of the written statement are listed below:

“The installation of the RSP (rock slope protection) caused predictable hydraulic effects and consequences....The chief hydraulic effect was a dramatic increase in marine energy in the mouth of the river. One chief consequence was the rapid-rate erosion of the coastal bluff east and southeast of the mouth. Erosion was so rapid and serious that in 1995 the RSP was extended about 1,200 feet to the south.

“The erosion of the coastal bluff occurred because marine waves and tidal currents removed the “toe support” of the erodible bluffs. This caused the upper part of the bluff to become unstable and begin to landslide...If the rate of erosion continues, which it is likely to, within a few years three of the homes on the bluff top will be destroyed or will have to be moved to the east.”

“...A second chief consequence of the installation of the groin...was the erosion of the northern end of Mad River Beach and foredune field. This effectively widened the mouth and exposed more of the bluff south of the RSP to erosion.

“...At the time Caltrans elected to build the RSP and groin, it had other alternatives with fewer predictable harsh consequences. The best of the reasonable alternatives was to dig a channel through the Mad River Beach in the vicinity of School Road, and not build any ...hard structures.

In the July 9, 1999 written statement, Dr. Busch concludes that Caltrans could have immobilized the mouth of the river by installing a revetment along the south bank of the mouth of the river at the same time it installed the extension of the revetment in 1995. Caltrans failure to do so “was directly responsible for the progressive southward widening of the mouth, the destruction of the sand spit, and the catastrophic destabilization of the bluff east of the river south to Widow White Creek.” Additional excerpts of the written statement are listed below:

“In 1992, a foredune-covered sand spit separated the Mad River from the ocean...When Caltrans installed the RSP in 1992, the spit immediately began to erode away in response to increased wave energy in the mouth of the river. The erosion rapidly progressed southward and now the spit no longer exists between the 1992 RSP and Widow White Creek, a distance of about 3500 feet. As a result of the destruction of the spit, catastrophic erosion began cutting away the exposed toe of the bluff...Today, the formerly vegetated bluff is mostly a bare faced sand cliff torn by active landslides, and the base of the bluff is exposed to direct attack by ocean waves at high tide...”

“The accelerated erosion of the reach of bluff south of the southern end of the 1995 RSP extension, which occurred after that extension was installed, was predictable with a high degree of certainty because accelerated erosion had occurred previously at the southern end of the long leg of the 1992 RSP.

“In conclusion, the accelerated erosion of the bluff between the southern end of the RSP and Widow White Creek would not have occurred as it did if Caltrans instead had installed RSP on both the north and south sides of the mouth of the river, or if Caltrans had placed RSP along the west edge of highway between the Vista Point overlook and Little River to the north. Although the chosen Caltrans RSP design effectively stopped the northward migration of the river and protected U.S. 101 and the Vista Point overlook, the design failure caused irreversible bluff instability and marine erosion of the east bank of the river south of the project.”

“Unless the base of the bluff is protected from ocean waves south of the RSP to Widow White Creek, chronic bluff failures, erosion, and sandstorm effects—which are a direct consequence of the configuration of the RSP—will continue along

that stretch of coast into the foreseeable future. It is also likely that as a direct result of the bluff failures and erosion, one or more homes will have to be destroyed or moved back from the top-of-bluff area in the imminent future.”

“Removal of the existing RSP will not stop the ongoing environmental damage initiated by the installation of the faulty RSP design. Only by extending RSP to Widow White Creek can Caltrans begin to compensate for the loss of the protective sand spit...”

In summary, the geologists hired by the property owners contend that the installation of the revetment significantly increased erosion of the bluffs upstream by directing wave energy that was previously expended on the sandy banks and beaches adjacent to the mouth up the river to areas not protected by RSP. In addition, as this wave energy progressively eroded away the end of the sand spit, more and more of the bluffs became exposed to direct wave attack from the open ocean, increasing the erosion and bluff retreat. Dr. Busch also contends that at least two alternatives to the constructed revetment would have avoided increasing erosion along the upstream bluffs, including (1) digging a channel through the Mad River Beach more than a mile south of the constructed revetment in the vicinity of School Road, and (2) fixing the mouth of the river in place by placing matching revetment on the other side of the mouth of the river. Both geologists predict the bluff slope upstream of the revetment will experience continued severe erosion unless additional bank stabilization is installed along the base of this bluff area.

The affected property owners have submitted written comments raising concerns about the increased erosion of the bluffs that their geologists attribute to the revetment to various agencies reviewing permit applications for permanent authorization of the revetment, including Humboldt County, the U.S. Army Corps of Engineers, and the Commission. In a September 30, 1998 Letter of Modification of the Army Corps permits granted for the project, the Corps added special conditions directing Caltrans to provide additional information. Among other things, this additional information was to include (a) responses to the comments submitted by the property owners and (b) a report that investigates the causes of beach bluff erosion that has occurred south of the 1995 RSP.

Caltrans prepared a response to this directive dated January 15, 1999. In addition to providing comments responding to the letters of the property owners, Caltrans provided a discussion of the results of a study prepared for Caltrans by Jeffry Borgeld, Ph.D. of the Department of Oceanography at Humboldt State University. Dr. Borgeld's report was not released, only a summation of some of the findings of the report prepared by Caltrans staff. In early 1999 Dr. Borgeld prepared an addendum to his report and in May of 1999, Caltrans submitted to the Commission a summary of information excerpted from both the 1999 addendum and the original 1998 report. A copy of this summary is attached as Exhibit 10. Commission staff has asked that Caltrans provide copies of the Borgeld reports. However, as of the date of this report, Caltrans has not provided to the

Commission or otherwise released either the actual 1998 Borgeld report or the 1999 addendum. Only the Caltrans staff prepared summaries have been made available.

As summarized by Caltrans staff, the Borgeld report concludes that because of complex coastal dynamics where the river inlet migration is occurring, predicting the future rate of erosion is very difficult. River mouth migration and erosion are influenced by river flow, tidal currents, ocean wave power and direction, the rate of sediment supply to the inlet, and other factors. Even past gravel extraction activities within the Mad River watershed may have been a major factor due to sediment reduction. The summaries highlight how during the 1997-1998 El Nino event, ocean wave heights, river discharges, and sea level elevations increased and affected the morphology of the lower Mad River spit and estuary. The summaries suggest that these factors were what caused the mouth of the river to erode and widen. The summaries indicate that the mouth widened to 1,000 meters (3,300 feet). This increased width in turn caused the bluffs along the east side of the river to erode more rapidly as was observed by the property owners' geologists.

Without the actual text of the Borgeld reports, it is difficult for the Commission to evaluate the information contained in the reports and to draw conclusions. In addition, without the reports, it is unknown whether the Borgeld reports provide responses to some of the specific points raised in the statements prepared by the property owners geologists, Dr. Busch and Mr. Johnson. For example, the Busch and Johnson statements indicate that the mouth of the river began widening soon after installation of the initial revetment in 1992 and accelerated after installation of the revetment extension in 1995. The El Nino event occurred during 1997-1998. How does the Borgeld report address the alleged widening of the mouth that began prior to the El Nino event? In addition, does the Borgeld report address the comment by Dr. Busch that installing additional revetment on the opposite side of the mouth along the sand spit would have stabilized the mouth and prevented the mouth from widening to the south where it exposed more of the bluffs to wave attack?

Section 30253 of the Coastal Act requires that new development neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. The geologic information provided by the upstream bluff top property owners indicates that the revetment has contributed significantly to the erosion and destruction of the bluffs along the river and will necessitate the future construction of shoreline protective devices to protect the homes atop the bluffs from the effects of bluff retreat. Without the Borgeld reports or other geotechnical information from the applicant that responds adequately to the specific points raised in the geotechnical information provided by the property owners' consulting geologists, the Commission cannot find that the project will not contribute significantly to the erosion and destruction of the bluffs along the river and will not necessitate the future construction of shoreline protective devices that would substantially alter the natural landform along the bluff. Therefore, based on the information available for its

review, the Commission finds that the project does not meet the requirements of Coastal Act Section 30253.

D. Fill in Coastal Waters and Wetlands.

The Coastal Act defines fill as including "*earth or any other substance or material ... placed in a submerged area.*" The proposed project includes the placement of fill in open coastal waters or wetlands in the form of the previously placed shoreline revetment along the banks of the Mad River, as well as the placement of earthen fill over dune hollow wetlands to create a portion of the construction staging area for the project

Section 30233 of the Coastal Act addresses the placement of fill within open coastal waters and wetlands. Section 30233(a) provides as follows, in applicable part:

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.

(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.

(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained as a biologically productive wetland. The size of the wetland area used for boating facilities, including berthing space, turning basins, necessary navigation channels, and any necessary support service facilities, shall not exceed 25 percent of the degraded wetland.

(4) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.

(5) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource dependent activities.

Section 30235 of the Coastal Act provides, in applicable part:

Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local sand supply.

The above policies set forth a number of different limitations on what fill projects may be allowed in coastal waters or wetlands. For analysis purposes, the limitations can be grouped into four general categories or tests. These tests are:

a. that the purpose of the fill is for one of the eight uses allowed under Section 30233, to serve coastal-dependent uses, or to protect existing structures or public beaches in danger from erosion; and

b. that the project is designed to eliminate or mitigate adverse impacts on local sand supply; and

c. that the project has no feasible less environmentally damaging alternative; and

d. that adequate mitigation measures to minimize the adverse impacts of the proposed project on habitat values have been provided.

a. Allowable Use

As noted above, the first test for a proposed fill to be approved under Chapter 3 of the Coastal Act is whether the fill is for one of the eight uses allowed under Section 30233, to serve coastal-dependent uses, or to protect existing structures or public beaches in danger from erosion. The revetment was installed on an emergency basis specifically to protect Highway 101, the major arterial along this part of the coast, and a vista point along the highway from bluff retreat. As these structures were threatened by the erosion caused by the extraordinary northward migration of the mouth of the Mad River, the Commission finds that the fill associated with the revetment is for an allowable purpose under Section 30235 of the Coastal Act.

b. Protection of Sand Supply

In addition to the limitations on the use of the revetment fill discussed above, Section 30235 mandates that revetment and similar fill shall only be approved if it is designed to eliminate or mitigate adverse impacts on local sand supply. Similarly, where fill is for an allowable purpose, Section 30233(a) requires that only the least environmentally damaging feasible alternative be approved, and provide feasible mitigation measures to minimize adverse environmental effects, including effects on sand supply.

There are a number of adverse impacts to public resources associated with the construction of shoreline structures. The natural shoreline processes referenced in Section 30235 of the Coastal Act, such as the formation and retention of sandy beaches, may be altered by construction of a revetment, since bluff retreat is one of several ways that beach area and beach quality sand is added to the shoreline. This retreat is a natural process resulting from many different factors such as erosion by wave action causing cave formation, enlargement and eventual collapse, saturation to the bluff soil from ground water causing the bluff to slough off and natural bluff deterioration. When a revetment development is constructed on the beach at the toe of the bluff, it directly impedes these natural processes.

Many of the effects of development on a beach are temporary or difficult to distinguish from all the other actions which modify the shoreline. Nevertheless, some of the effects which shoreline development may have on natural shoreline processes can be quantified. Three of the effects from such development which can be quantified are: 1) loss of the beach area on which the fill is located; 2) the long-term loss of beach which will result when the back beach location is fixed on an eroding shoreline; and 3) the loss of material which would have been supplied to the beach if the shoreline continued to erode naturally.

The applicant was asked orally to provide information on the effects of the project on shoreline processes. However, none of the information provided to date, including the summations of the Borgeld reports provides an analysis of the impacts of the project on local sand supply.

Thus, there is no substantive evidence before the Commission that the proposed project is designed to eliminate or mitigate adverse impacts on local sand supply. Therefore, the Commission finds that the project does not meet the requirement of the Coastal Act Section 30235 with regard to impacts on sand supply. Therefore, the proposed fill need not be approved under Section 30235. The Commission also finds that the proposed project does not meet the requirement of the Coastal Act Section 30233 because it fails to provide feasible mitigation measures to minimize adverse environmental effects on sand supply.

c. Alternatives.

Coastal Act Section 30233 does not allow fill of coastal waters or other wetlands if there is a feasible, less environmentally damaging alternative to the project. Alternatives to the project as proposed must be considered before a finding can be made that a project satisfies this provision of Section 30233.

The applicant has submitted an analysis of alternatives to the project which was originally prepared for the Army Corps of Engineers pursuant to U.S. Environmental Protection Agency Section 404(b)(1) Guidelines for Discharge of Fill or Dredged Material. The analysis was not prepared as a comprehensive environmental analysis, but rather meant to provide a basis for comparing the relative environmental effects of the alternatives and construction feasibility. The alternatives considered in the evaluation include (1) maintaining the existing rock slope protection project at the Mad River mouth, (2) placing rock slope protection along the base of the Mad River bluff beginning at the south end of the existing RSP revetment and extending upriver; (3) constructing small debris dams and wing dams along the Mad River bluff to deflect the river current and prevent bluff undercutting, (4) constructing a revetment along the base of the Mad River bluff using woody debris as an alternative to placement of quarried rock slope protection, (5) placing a palisades netting system designed to reduce the river velocity and erosion, (6) artificially breaching the spit between the ocean and the Mad River to re-establish the river mouth near its historic, oscillating range approximately between School Road and the Mad River Slough area, and confining the mouth with structures, (7) breaching the historic mouth of the Mad River on an emergency basis without confining structures, and (8) relocating Highway 101 by constructing a bypass.

The analysis of alternatives concludes that Alternative 1, maintaining the existing rock slope protection project at the Mad River mouth “was determined to be the most practicable alternative and to be the least environmentally harmful,” as it would require no further filling of wetlands and would provide for the continued protection of the Route 101 roadway. Alternatives 2 through 8 were found to either not be feasible or would have greater adverse environmental effect.

Alternative 2, armoring the entire base of the Mad River bluff beginning at the south end of the existing RSP revetment and extending upriver was determined to have substantial impact to the estuary that would be difficult to fully mitigate. In addition, the alternatives analysis indicates the hydrological effects of the alternative are largely unknown and would require a detailed study to address changes in river/estuary velocity, turbidity, flooding risks, sedimentation, and erosion. The alternatives analysis indicates the hydrology study results would be critical for the environmental evaluation of potential effects to anadromous fish habitat at this location.

Alternatives 3-5, which include two proposals to protect the Mad River bluff with revetment designs utilizing natural woody materials and the alternative of installing a

palisades netting system to reduce river velocity and erosion were determined by Caltrans to either be infeasible to construct or unlikely to succeed.

Alternative 6, reopening the historic mouth and installing structures to stabilize the mouth in place could result in increased erosion of the bluff near the new mouth and could result in the loss of two miles of estuarine habitat as the existing mouth seals off and the stretch of river downstream of the historic mouth fills in with sand. Thus, this alternative was rejected as creating greater environmental effect. The analysis also indicates Caltrans would be concerned about assuming the liability for maintaining the river mouth in this location and for any erosion effects the alternative would have on property owners located along the bluffs above this location.

Alternative 7, breaching the historic mouth on an emergency basis without structures to contain the mouth and prevent its migration was rejected because of questionable effectiveness. There is a high potential that the breach may immediately close upon breaching, and if the breach did not close, the alternative would have unacceptable environmental effects similar to Alternative 6.

Alternative 8, relocating Highway 101 was dismissed because constructing a four-lane freeway bypass would have a high construction cost and would have substantial environmental impacts.

An alternative that was not considered in the Alternatives Analysis submitted by the applicants was a variant of the alternative suggested by Dr. Busch of fixing the mouth of the Mad River at the location of the constructed revetment by installing an additional revetment on the south sides of the mouth of the river. Had such a southern revetment been constructed at the same time as the existing revetment, Dr. Busch opined that the mouth would have been fixed in place, the sand spit would not have eroded southward, and most of the bluffs south of the mouth would not have been exposed to wave attack and the resulting accelerated erosion and bluff retreat. As noted earlier, the river has recently created its own new breach through the sand spit about a mile south of the revetment. Recent aerial photographs show that the area south of the revetment is filling in with sand. However, given the historic oscillation of the river mouth, there is a good chance the breach will begin migrating northward again. It may be feasible to construct a new revetment opposite the existing revetment in the desired configuration to trap and fix the mouth of the river should it migrate north again. If the alternative is feasible and could fix the mouth of the river, the alternative would conceivably have the benefit of stopping the accelerated bluff erosion attributed to the revetment as constructed, while requiring much less placement of fill and resulting environmental impact than armoring the entire bluff between the existing revetment and Widow White Creek discussed under Alternative 2 and as proposed by the bluff top property owners concerned about bluff retreat.

The Commission has found above that the project cannot be approved because of the project's inconsistency with Coastal Act Section 30235. The Commission cannot make the required finding that the project will not contribute significantly to erosion and will not necessitate the future construction of shoreline protective devices that would substantially alter the natural landform along the bluff. However, even if it was determined the project would not contribute to erosion and would otherwise be consistent with Section 30253, the project could only be permitted if there is no feasible less environmentally damaging alternative. Given that the alternative described above of constructing a new revetment opposite the existing revetment in the desired configuration to trap and fix the mouth of the river should it migrate north again has not been evaluated, the Commission could not make the required finding under Section 30233 of the Coastal Act that the project as proposed is the least environmentally damaging feasible alternative.

d. **Mitigation Measures.**

As noted above, the fourth test for a proposed fill to be approved under Chapter 3 of the Coastal Act is whether feasible mitigation measures have been provided to minimize adverse environmental effects

The applicants have submitted a wetlands mitigation plan as part of the application. The mitigation plan is attached as Exhibit 7. However, the Commission has found above that the project cannot be approved because of the project's inconsistency with Coastal Act Section 30235. The Commission cannot make the required finding that the project will not contribute significantly to erosion impacts. Thus, until the erosion impacts of the revetment are fully addressed, the full extent of the adverse environmental effects of the project will remain unknown. Therefore, the Commission cannot evaluate the submitted mitigation plan for consistency under Section 30233 at this time.

EXHIBITS:

1. Regional Location Map
2. Vicinity Map
3. Phase I Site Plan
4. Phase II Site Plan
5. Historical Migration of River Mouth
6. Humboldt County Notice of Final Action
7. Mitigation Plan
8. Johnson Geologic Report
9. Busch Geologic Report
10. Caltrans Response to Erosion Concerns
11. Correspondence